Ontario Geological Survey

Northern Ontario
Engineering Geology Terrain Study 68

SAND POINT LAKE AREA

(NTS 52C/SE)

District of Rainy River

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ONTARIO MINISTRY OF NORTHERN DEVELOPMENT AND MINES
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by
M.A. Roed

1980

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MAP
(accompanying report)

Map 5071 (coloured) – Northern Ontario Engineering Geology Terrain Study, Data Base Map, Sand Point Lake (NTS 52C/SE). Scale 1:100 000.

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1.0 INTRODUCTION

This report and the accompanying map present the results of an engineering geology terrain study for the Sand Point Lake area, District of Rainy River. The area, which covers NTS block 52C/SE, lies between Latitudes 48°13'N and 48°30'N and Longitudes 92°00'W and 92°43'W. The report and map form part of a series of publications which provide similar terrain data for approximately 370 000 km^2 of northern Ontario.

The purpose of this study is to provide an inventory of engineering geology terrain conditions that will serve as a basic data framework for engineering and resource planning activities, at a level of detail consistent with a scale of 1:100 000. The terrain information is contained on the Data Base Map (OGS Map 5071, accompanying this report).

Interpretation of 1976 black and white aerial photographs, at a scale of approximately 1:50 000, formed the basis of the terrain mapping

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process. The interpretation was compared to relevant published information for the study area. Field work to provide a check on the office studies was not possible in the Sand Point Lake area due to the lack of roads. Thus, the Data Base Map represents an airphoto reconnaissance overview of the engineering conditions of the terrain.

An engineering terrain legend was developed to facilitate the mapping and to provide a common information base for the entire map series. This legend is shown on the accompanying Data Base Map. Further discussion on the mapping techniques, legend format, and possible uses of this engineering geology information is available in the Ontario Engineering, Geology Terrain Study Users' Manual (Gartner, Mollard, and Roed 1980), a companion publication to this series of maps and reports.

2.0 GEOLOGIC SETTING

The Sand Point Lake area is underlain by crystalline bedrock of Precambrian age, which is covered in places by a patchy mantle of Quaternary surficial deposits. The terrain is dominated by bedrock landforms, but ground moraine is well represented. Organic terrain is widespread and minor amounts of glaciolacustrine and glaciofluvial deposits have been mapped, but alluvial deposits are poorly represented.

2.1 BEDROCK GEOLOGY

The Sand Point Lake area lies within the Wabigoon Belt in the Superior Province of the Canadian Shield. The area is underlain by two distinct types of bedrock, both of Early Precambrian age. The predominant group, a sequence of steeply dipping metasediments, occupies almost the entire northern part of the area. The second group, consisting of undifferentiated felsic igneous and metamorphic rocks, intrudes the metasediments in the area south of Wilkins Bay and in several other localities throughout the southern and northwestern parts of the map-area (Davies and Pryslak 1967).

The area is considered to be low in mineral potential, but has not been studied in any detail (Springer 1978).

2.2 QUATERNARY GEOLOGY

Northwestern Ontario was affected by several stages of continental glaciation during the Pleistocene. However, only deposits of the last glaciation, the Laurentide of Wisconsinan age, are preserved in the Sand Point Lake area. The ice began to advance approximately 100 000 years ago and travelled as far south as central Wisconsin before receding. The ice disappeared from the Sand Point Lake area approximately 15 000 years ago (Prest 1970). Zoltai (1961) gives a more complete account of the glacial history of the region.

Widespread stagnation of the ice mass resulted in the deposition of a variety of surficial materials. Till was deposited directly by the ice in the form of ground moraine. Meltwater from the glacier formed the glaciofluvial outwash deposit north of Namakan Lake and the spillway channels north of Bearpelt Creek. Ponded meltwater accumulated in lowlands to form glacial lakes. These grew in size and eventually coalesced to form an enormous body of water, located to the northwest of the area and called Glacial Lake Agassiz. Only scattered clay and silt deposits of this glacial lake occur in the lowlands of the Sand Point Lake. In the rocky uplands, the glacier over-deepened valleys, rounded off bedrock outcrops, formed box canyons, and left scattered patches of moraine and boulders. Glacial lake water did not inundate large parts of these uplands.

The complete disappearance of glacial ice and the gradual draining or drying up of glacial lakes marked the end of the Pleistocene Stage of the Quaternary Period in the area. Since that time, approximately 9 000 years ago (Prest 1970), modern streams have developed alluvial flood plains and organic deposits have accumulated in wet depressions. These deposits are nonglacial in origin and, together with the various glacial materials, comprise the variety of Quaternary unconsolidated deposits that forms a discontinuous mantle over the bedrock in the Sand Point Lake area.

2.3 PHYSIOGRAPHY

The area is dominated by rugged knobby topography. Elevations range from 338 m at Namakan Lake in the western part of the area to 549 m near Lilac Lake in the southern extremity of the area. There are numerous bedrock scarps which are commonly located adjacent to water

courses. Waterfalls and rapids are characteristic features of the waterways. Local relief is most extreme in the southern part of the area, where differences in elevation of up to 60 m occur. Northward, local relief becomes moderate (15 to 60 m) and the topography more undulating.

Lowlands include alluvial plains along rivers, organic terrain, and a ground moraine unit which flanks Threemile Lake in the north-central part of the map-area.

3.0 ENGINEERING TERRAIN UNITS

Engineering terrain units are composed of a combination of various materials (unconsolidated and/or bedrock) which form recognizable landforms with certain engineering characteristics. Major terrain unit groups, and the engineering significance of each, are discussed in detail. These include bedrock terrain (RN), ground moraine (MG), and organic terrain (OT). Less significant terrain units include glaciolacustrine plains (LP), glaciofluvial outwash (GO), and alluvial plains (AP). A diagrammatic sketch of a typical terrain setting is given in Figure 1. Table 1 summarizes the characteristics and engineering significance of the major terrain units in the Sand Point Lake area.

3.1 BEDROCK

Examples: $\frac{\text{RN(tsMG) (pOT)}}{\text{Mnj-D(M)}}$ $\frac{\text{RN(tsMG)(pOT)}}{\text{Hnj-D(M)}}$

Knobby bedrock terrain (RN) is dominant in this map-area. Relief of the unit is high (H) (greater than 60 m) in the southern part of the area and moderate (M) in the north, near Thompson Lake and north of Lac La Croix. The terrain is rugged (j) in the southern part where scarps and steep slopes dominate the landscape. Drainage in this unit is generally good (D). A thin, discontinuous layer of ground moraine till (tsMG) is present throughout the lower lying portions of the terrain unit. This till is thickest in bedrock depressions, particularly on the south side of bedrock knobs. Poorly drained depressions contain peat (pOT).

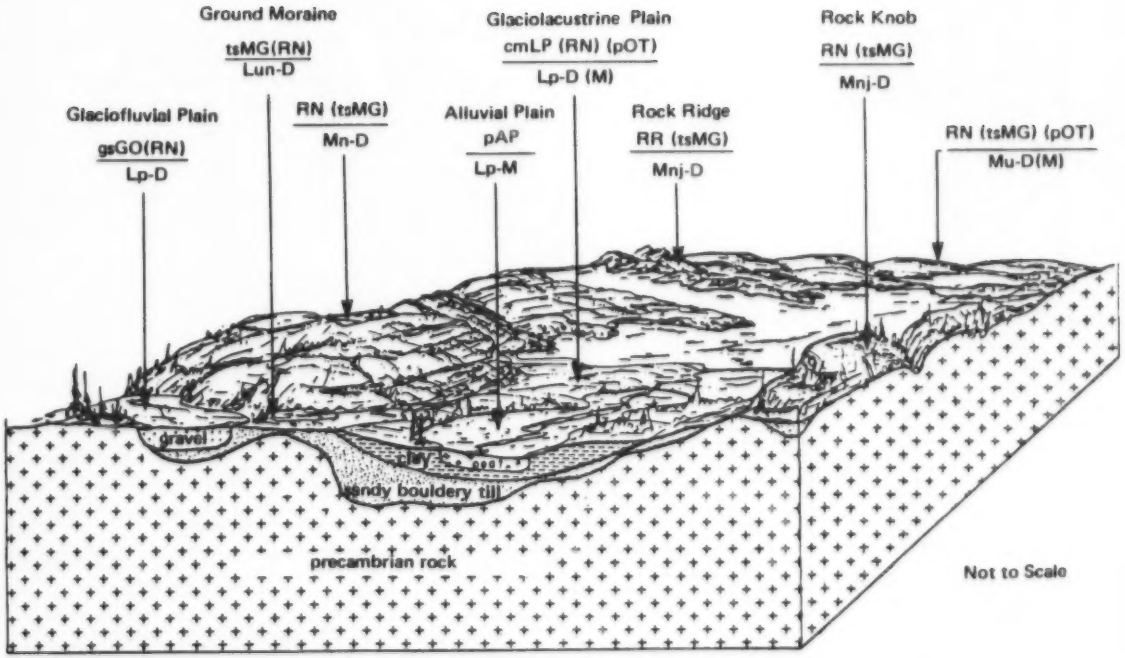

FIGURE 1 – DIAGRAMMATIC SKETCH SHOWING TYPICAL TERRAIN TYPES AND THEIR REPRESENTATIVE LETTER SYMBOLS.

TABLE 1 | SUMMARY OF TERRAIN UNIT CHARACTERISTICS AND ENGINEERING SIGNIFICANCES, SAND POINT LAKE AREA.

CLASSIFICATION		ENGINEERING USE				
Terrain Unit and Location	**Material; Relief; Topography; Drainage**	**General Construction**	**Transportation Routes**	**Waste Disposal**	**Groundwater Supply**	**Major Constraints**
BEDROCK TERRAIN (RN), throughout the area	rock; relief varies from 15 to 30 m; rugged; drainage is good	excavations and fill necessary for most construction	blasting and fill necessary; aggregate in small pockets	pollution potential is high	domestic supply from deep wells	rugged terrain; lack of aggregate; blasting required
GROUND MORAINE (MG), close to the Namakan River and as a veneer over parts of the bedrock terrain	sandy till (ts); relief varies from 0 to 30 m; knobby to undulating; is good	excavations and fill are necessary for some types of construction	excavation and fill easier than in bedrock terrain; aggregate in spillways west of Wolseley Lake	fair to good	poor to fair	deposits are thin; aggregate often must be imported; possibility of near-surface bedrock
ORGANIC TERRAIN (OT), scattered through the area	peat (p); relief is low; planar; drainage is poor	low-bearing capacity; high compressibility; frost susceptible	unsuitable subgrade except for minor light vehicle roads	pollution potential is high	quantity and quality of water is poor	low strength; high frost susceptibility; poor drainage

Comments: Glaciofluvial outwash sand and gravel (sgGO) occurs locally in small pockets and would provide sufficient material for forest access roads but not major roads. Glaciolacustrine silt and clay (cmLP) occur beneath some organic deposits, but are not extensive. Alluvial plains of silt and peat (mpAP) occur along most streams, but are too small to map at this scale.

The principal engineering significance of bedrock terrain is that it is difficult and expensive to excavate. Due to the rugged topographic character, extreme alignment techniques and extensive cut-and-fill operations are necessary for adequate road construction. Since, in many places, this unit has a limited supply of unconsolidated material and a shortage of aggregate, importation of suitable materials would be necessary and would involve considerable expense. It was noted, however, that thick blankets of ground moraine till do occur in association with some bedrock landforms. Careful exploration for this soil type could substantially decrease engineering difficulties in bedrock terrain. Although local deposits of glaciofluvial sand and gravel can be expected, aggregate is generally scarce.

Groundwater can occur in fractures and along fault zones in the rock, but this terrain unit is considered to have only poor to fair potential for groundwater supply. Rock terrain is unsuitable for surface waste disposal of any kind, except where there is a thick layer (at least 1.5 m) of attenuating soil material.

3.2 MORAINE

Examples: $\frac{\text{tsMG(RN)}}{\text{Ln-D}}$ $\frac{\text{tsMG/RN(RN) (pOT)}}{\text{Mu-D(W)}}$

Ground moraine composed of sandy till (tsMG) occurs around Wright Lake. The surface is knobby (n) or undulating (u) and low in relief (L). The terrain is well drained (D), but is bisected by a major organic unit (pOT). Thin till over an undulating bedrock surface (tsMG/RN) occurs northwest of Wolseley Lake. This unit is of moderate relief (M) and is well drained. All ground moraine includes bedrock knobs (RN) and poorly drained pockets of organic terrain (pOT).

Ground moraine provides the only substantial local source of aggregate, but the quality of the material is poor. This well-drained terrain is suitable for construction and for waste disposal where the till is sufficiently thick. Septic tile field development is generally feasible, but groundwater potential is poor.

3.3 GLACIOFLUVIAL

Example: $\frac{sGO}{Lp\text{-}M}$

The outwash deposit (GO) located north of Namakan Lake is limited in size, but due to its uniqueness in the Sand Point Lake area, it has been mapped. The unit is planar (p) and low in relief (L), has mixed drainage conditions (M), and is inferred to consist of sand(s). Other small deposits likely occur in the map-area, and gravel may be present along the meltwater channels north of Bearpelt Creek. The unit is important as a source of aggregate, but the deposits appear to be local in extent.

3.4 GLACIOLACUSTRINE

Examples: $\frac{pOT(cmLP)\,(RN)}{Lpn\text{-}M}$ $\frac{pOT/cmLP}{Lp\text{-}M}$

All glaciolacustrine (LP) terrain appears to be overlain by organic material (pOT). Deposits are restricted to poorly drained (M or W) lowland areas. The unit is inferred to consist of silty clay in most places, and bedrock knobs (RN) may be present.

The engineering significance of glaciolacustrine terrain is the same as that of organic terrain in this map-area, since organic deposits overlie it. Thus, the unit is poorly drained, has low strength, and is compressible and frost-susceptible. The unit is not suitable as a groundwater source or for waste disposal.

3.5 ALLUVIAL

Examples: $\frac{pAP}{Lp\text{-}W}$ $\frac{spAP}{Lp\text{-}W}$

Alluvial terrain (AP) is present along most drainage courses and is composed of peat (pAP) or peaty sand (spAP). Relief is low (L) and the unit is poorly drained (W).

Alluvial terrain may be subject to flooding. Also, due to the predominance of fine-grained and organic material, it is a very poor foundation material. Some steep slopes along Sand Point Lake and Gullwing Creek may be susceptible to erosion and slumping. Groundwater potential is poor and the unit is unsuitable for waste disposal.

3.6 ORGANIC

Examples: $\frac{\text{pOT}}{\text{Lp-W}}$ $\frac{\text{pOT/cmLP}}{\text{Lp-M}}$

Organic terrain composed of peat (pOT) is found in poorly drained (M or W) depressions. Deposits in the northeastern part of the map-area are inferred to be underlain by glaciolacustrine silty clay (cmLP).

Engineering use of organic terrain is restricted, due to the poor drainage conditions and the low strength, high compressibility, and extremely high frost susceptibility of the soil materials. The unit is a very poor source of groundwater and is unsuitable for waste disposal.

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